PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

KRAWCZYK, Nancy T.
THE GOODYEAR TIRE & RUBBER COMPANY
Department 823
1144 East Market Street
Akron, Ohio 44316-0001
ETATS-UNIS D'AMERIQUE

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Rule 71.1)

10/5/00

Date of mailing *(day/month/year)*	27.09.2000
Applicant's or agent's file reference	**IMPORTANT NOTIFICATION**
DN1999111PCT	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US99/10422	12/05/1999	12/05/1999

Applicant
THE GOODYEAR TIRE & RUBBER COMPANY et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Stafl, C Tel.+49 89 2399-2698

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
DN1999111PCT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US99/10422	12/05/1999	12/05/1999
International Patent Classification (IPC) or national classification and IPC		
F16F9/05		
Applicant		
THE GOODYEAR TIRE & RUBBER COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   I ☒ Basis of the report
   II ☐ Priority
   III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   IV ☐ Lack of unity of invention
   V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   VI ☐ Certain documents cited
   VII ☒ Certain defects in the international application
   VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10/03/2000	27.09.2000
Name and mailing address of the international preliminary examining authority:	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Alfaro Martinez, J Telephone No. +49 89 2399 7337

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/10422

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1,2,4,6	as originally filed			
3,5	as received on	08/08/2000	with letter of	02/08/2000

Claims, No.:

1-9	as received on	08/08/2000	with letter of	02/08/2000

Drawings, sheets:

1/4-4/4	as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-9
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-9
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-9
	No:	Claims

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following document:

   D1: US-A-5 535 994 (SAFREED JR CARL K) 16 July 1996 (1996-07-16) cited in the application

2. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (see Fig. 1 and description col 1, line 58 to col 3, line 33): An airspring comprising a flexible cylindrical sleeve (15) secured at opposing retainers (21,36), one of the retainers (21) having a bumper-contact surface (27) within the sleeve, for axial movement into the sleeve, for contact with the other retainer, and for absorbing and transmitting forces generated from such contact.

3. The subject-matter of claim 1 therefore differs from the airspring of D1 in that the bumper-contact surface of the present application is integrally formed in the retainer.

   The bumper of D1 is not formed as an integral part of the retainer, but is made of a different material and is secured to the surface of the retainer.

   Claim 1 claims an airspring with a bumper integrally formed of the same material as the retainer, seeking to improve the reduced weight of an airspring further than that known in the prior art and to reduce the cost of production. This object is achieved with the features of independent claim 1.

4. Since the combination of features contained in the independent claim is neither known from nor rendered obvious by the cited prior art, the subject-matter of claim 1 meets the requirements of Article 33 (2) and (3) PCT.

5. Claims 2-9 are dependent on claim 1, thus also meeting the requirements of Art. 33(2) and 33(3) of PCT.

7. The industrial applicability of claims 1-9 is apparent and thereby satisfies Art. 33(4).

Re Item VII

Certain defects in the international application

1. Although claim 1 is drafted in the two-part form the features "having a bumper-contact surface within the sleeve for axial movement into the sleeve, for contact with the other retainer, and for absorbing and transmitting forces generated from such contact" are incorrectly placed in the characterising portion, as they are disclosed in document D1 in combination with the features placed in the preamble (Rule 6.3(b) PCT).

end of the sleeve being to one of the retainers, and the opposing end of the sleeve being secured to other retainer. One of the retainers has an integral bumper-contact surface which, when the airspring is assembled, extends into the sleeve for axial movement. The bumper-contact surface of the retainer also extends into the sleeve for making contact with the other retainer, and for absorbing and transmitting forces generated from such contact.

The disclosed retainer that has an integral bumper-contact surface is also comprised of support ribs. The support ribs may be a series of concentric ribs. The support ribs may also be radially extending ribs.

The disclosed retainer that has an integral bumper-contact surface may be defined by a first axially outer surface that extends into the airspring sleeve and a second axially outer surface that extends into the airspring sleeve. The axially outermost of the two surfaces is the bumper-contact surface and the axial difference between the two surfaces being greater than zero to separate the two surfaces by a dimension b.

The disclosed retainer that has an integral bumper-contact surface has an axial height H as measured from the axially outer most surface to the axially innermost surface. The surface-separation dimension b may be expressed as a ratio of the retainer height and may be from 20% to 80% of the retainer height H.

The airspring may further comprise a piston and the flexible sleeve may have a bead ring at one end. The bead ring may be secured between the retainer having an integral bumper-contact surface and the piston.

The retainer having an integral bumper-contact surface is formed from a thermoplastic material having a tensile strength in the range of 1965 to 3165 kg/cm^2 (28,000 to 45,000 psi), and a flex strength in the range of 2810 to 4220 kg/cm^2 (40,000 to 60,000 psi).

The retainer is preferably formed from a material selected from the following group: fiberglass reinforced nylon, long fiber reinforced thermoplastic, and short fiber reinforced thermoplastic.

Brief Description of Drawings

The invention will be described by way of example and with reference to the accompanying drawings in which:

FIG. 1 is a cross-sectional view of an airspring;

FIG. 2 is a cross-sectional view of the airspring piston and lower retainer;

FIG. 3 is a cross-sectional view of the retainer;

FIG. 4 is a view of the top surface of the retainer; and

FIGS. 5 and 6 are embodiments of the retainer.

by a series of radially extending ribs 48 (see Fig 4). The ribs 48 connecting the concentric outer 44 and intermediate 40 ribs may be termed as extensions of the ribs 42 connecting the central rib 34 and the intermediate rib 40. The ribs 48 continue to the outer surface 50 of the retainer 26, linking the bead retention flange 46 to the outer surface 50 of the retainer. The radially extending ribs 42, 48 provide structural support and strength to the retainer 26. The circular ribs 34,40,44 and the radially extending ribs 42,48 allow the forces absorbed by the retainer 26 to be transferred through the retainer 26 to the piston and the rest of the airspring as well as the structure upon which the airspring is mounted.

The retainer 26 has a surface 52 which extends into the chamber 20 created by the secured sleeve 14. The surface 52, also known as the bumper-contact surface, may be flush with the main surface 50 of the retainer 26, as illustrated in FIG. 5, or it may be separated from the surface 50 by a dimension equal to b, see FIGS. 3 and 6. The surface separation dimension b may also be defined as relative to the total axial height H of the retainer 26. The surface separation between the bumper contact surface 52 and the main retainer surface 50 may be considered to be an axial extension of the concentric rib 40. The radially extending ribs 42 will also extend the full depth of the retainer when the dimension b is greater than zero.

The retainer height H is measured from the axially outermost surface, which is the bumper-contact surface 52, to the axially innermost point of the retainer. All of the illustrated retainers are shown having an axially innermost point all corresponding to the same plane; however, if any of the concentric or radially extending ribs of the retainer extend beyond any of the other ribs, the height of the retainer is measured from that portion of the retainer which has the greatest axial length. The dimension b, when expressed relative to the retainer height H, may range from zero to approximately eighty percent (0-80%) of H. In FIG. 3, the surface separation distance b is approximately 25% of the retainer height H. In FIG. 6, the distance b is approximately one-half the retainer height H. For all of the illustrated embodiments of the retainer 26, the central portion 54 of the bumper-contact surface 52 is eliminated to reduce the weight of the retainer 26 and to maintain a uniform ring thickness to assist in molding the retainer 26.

The retainer 26 is formed of a high strength thermoplastic. The tensile strength of the material should be within the range of 1965 to 3165 kg/cm^2 (28,000 to 45,000 psi), have a flex strength in the range of 2810 to 4220 kg/cm^2 (40,000 to 60,000 psi), and notched izod strength of 0.117 – 0.703 N-m/mm (2.0 to 12.0 ft-lb/in). Materials that meet these required characteristics include, but are not limited to, fiberglass reinforced nylon, long fiber reinforced thermoplastic, commercially available as CELSTRAN, and short fiber

CLAIMS

What is claimed is:

1. An airspring (10) comprising a flexible cylindrical sleeve (14) secured at opposing ends, and first and second retainers (12, 26), the sleeve being secured at a first end to one of the retainers (12 or 26), and at the opposing end to the other retainer (26 or 12), the airspring (10) being characterized by:

one of the retainers (26) having an integrally formed bumper-contact surface (52) within the sleeve (14) for axial movement into the sleeve (14), for contact with the other retainer (12), and for absorbing and transmitting forces generated from such contact.

2. An airspring (10) in accordance with claim 1 wherein the retainer (26) having an integral bumper-contact surface (52) is comprised of support ribs (34, 40, 42, 44, 48).

3. An airspring (10) in accordance with claim 2 wherein the support ribs are substantially radially extending (42, 48).

4. An airspring (10) in accordance with claim 2 wherein the support ribs are a series of concentrically disposed ribs (34, 40, 44).

5. An airspring (10) in accordance with claim 1 wherein the retainer (26) having an integral bumper-contact surface (52) is defined by a first axially outer surface (52) which extends into the airspring sleeve (14) and a second axially outer surface (50) which extends into the airspring sleeve (14), the axially outermost of the two surfaces being the bumper-contact surface (52) and the axial difference between the two surfaces being greater than zero to separate the two surfaces by a dimension (b).

6. An airspring (10) in accordance with claim 5 wherein the retainer (26) having an integral bumper-contact surface (52) has an axial height (H) as measured from the axially outer most surface (52) to the axially innermost surface, and the surface-separation dimension (b) is 20 to 80% of the retainer height (H).

7. An airspring (10) in accordance with claim 1 wherein the airspring (10) further comprises a piston (28) and the flexible sleeve (14) is comprised of a bead ring (24) at one end, the bead ring

(24) being secured between the retainer (26) having an integral bumper-contact surface (52) and the piston (28).

8. An airspring (10) in accordance with claim 1 wherein the retainer (26) having an integral bumper-contact surface (52) is formed from a thermoplastic material having a tensile strength in the range of 1965 to 3165 kg/cm^2 (28,000 to 45,000 psi), and a flex strength in the range of 2810 to 4220 kg/cm^2 (40,000 to 60,000 psi).

9. An airspring (10) in accordance with claim 8 wherein the retainer (26) is formed from a material selected from the following group: fiberglass reinforced nylon, long fiber reinforced thermoplastic, and short fiber reinforced thermoplastic.

INTERNATIONAL SEARCH REPORT

tional Application No
PCT/US 99/10422

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F16F9/05

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F16F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 1 540 178 A (METALASTIK) page 2, right-hand column, paragraph 5; figure 1	1
A	DE 296 15 901 U (BPW BERGISCHE ACHSEN KG) 24 October 1996 (1996-10-24) figure 3	1
A	US 5 535 994 A (SAFREED JR CARL K) 16 July 1996 (1996-07-16) cited in the application column 2, line 42 - line 50; figure 1	1
A	US 2 988 353 A (E.R. DIETRICH) 13 June 1961 (1961-06-13)	
A	GB 830 283 A (GOODYEAR)	

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 December 1999	11/01/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Pemberton, P

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 950 104 A (P.C. BOWSER ET AL.) 23 August 1960 (1960-08-23) cited in the application	
A	US 5 201 500 A (BROWN MICHAEL M ET AL) 13 April 1993 (1993-04-13) cited in the application	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 99/10422

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 1540178 A		DE 1291566 B	
DE 29615901 U	24-10-1996	GB 2317213 A	18-03-1998
US 5535994 A	16-07-1996	CA 2117051 A	31-05-1995
US 2988353 A	13-06-1961	NONE	
GB 830283 A		BE 561179 A	
		CH 362327 A	
		DE 1107030 B	
		NL 109093 C	
		NL 220888 A	
		US 3043582 A	10-07-1962
US 2950104 A	23-08-1960	DE 1048491 B	
		FR 1200709 A	23-12-1959
		GB 811546 A	
US 5201500 A	13-04-1993	AU 649292 B	19-05-1994
		AU 8882291 A	27-08-1992
		CA 2060644 A	27-08-1992
		DE 69112603 D	05-10-1995
		DE 69112603 T	15-02-1996
		EP 0501043 A	02-09-1992
		ES 2076456 T	01-11-1995
		JP 4307134 A	29-10-1992
		MX 9102793 A	01-08-1992
		NZ 240968 A	27-07-1993

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
DN1999111PCT		
International application No. PCT/US99/10422	International filing date *(day/month/year)* 12/05/1999	Priority date *(day/month/year)*
International Patent Classification (IPC) or national classification and IPC F16F9/05		
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10/03/2000	27.09.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Alfaro Martinez, J Telephone No. +49 89 2399 7337

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/10422

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1,2,4,6	as originally filed			
3,5	as received on	08/08/2000	with letter of	02/08/2000

Claims, No.:

1-9	as received on	08/08/2000	with letter of	02/08/2000

Drawings, sheets:

1/4-4/4	as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-9
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-9
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-9
	No:	Claims

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following document:

   D1: US-A-5 535 994 (SAFREED JR CARL K) 16 July 1996 (1996-07-16) cited in the application

2. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (see Fig. 1 and description col 1, line 58 to col 3, line 33): An airspring comprising a flexible cylindrical sleeve (15) secured at opposing retainers (21,36), one of the retainers (21) having a bumper-contact surface (27) within the sleeve, for axial movement into the sleeve, for contact with the other retainer, and for absorbing and transmitting forces generated from such contact.

3. The subject-matter of claim 1 therefore differs from the airspring of D1 in that the bumper-contact surface of the present application is integrally formed in the retainer.

   The bumper of D1 is not formed as an integral part of the retainer, but is made of a different material and is secured to the surface of the retainer.

   Claim 1 claims an airspring with a bumper integrally formed of the same material as the retainer, seeking to improve the reduced weight of an airspring further than that known in the prior art and to reduce the cost of production. This object is achieved with the features of independent claim 1.

4. Since the combination of features contained in the independent claim is neither known from nor rendered obvious by the cited prior art, the subject-matter of claim 1 meets the requirements of Article 33 (2) and (3) PCT.

5. Claims 2-9 are dependent on claim 1, thus also meeting the requirements of Art. 33(2) and 33(3) of PCT.

7. The industrial applicability of claims 1-9 is apparent and thereby satisfies Art. 33(4).

Re Item VII
Certain defects in the international application

1. Although claim 1 is drafted in the two-part form the features "having a bumper-contact surface within the sleeve for axial movement into the sleeve, for contact with the other retainer, and for absorbing and transmitting forces generated from such contact" are incorrectly placed in the characterising portion, as they are disclosed in document D1 in combination with the features placed in the preamble (Rule 6.3(b) PCT).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

To:
THE GOODYEAR TIRE & RUBBER COMPANY
Department 823
Attn. KRAWCZYK, N.
1144 East Market Street
Akron, Ohio 44316-0001
UNITED STATES OF AMERICA

	Date of mailing *(day/month/year)* 11/01/2000
Applicant's or agent's file reference DN1999111PCT	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 99/ 10422	International filing date *(day/month/year)* 12/05/1999
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.	

1. [X] The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Josephus Wannee

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JAN 19 2000
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Form PCT/ISA/220 (July 1998)

JAN 20 2000

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international pbulication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped),whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international appplication is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
DN1999111PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 99/ 10422	12/05/1999	
Applicant		
THE GOODYEAR TIRE & RUBBER COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[ ] the text is approved as submitted by the applicant.

[X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

[ ] None of the figures.

[X] as suggested by the applicant.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/ 10422

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

Line 1: insert after "airspring" "(10)"
Line 1: insert after "airsleeve" "(14)"
Line 1: insert after "retainers" "(12,26)"
Line 2: insert after "retainer" "(26)"
Line 2: insert after "surface" "(52)"
Line 4: insert after "ribs" "(34,40,42,44,46)"

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/10422

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F16F9/05

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F16F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 1 540 178 A (METALASTIK) page 2, right-hand column, paragraph 5; figure 1	1
A	DE 296 15 901 U (BPW BERGISCHE ACHSEN KG) 24 October 1996 (1996-10-24) figure 3	1
A	US 5 535 994 A (SAFREED JR CARL K) 16 July 1996 (1996-07-16) cited in the application column 2, line 42 - line 50; figure 1	1
A	US 2 988 353 A (E.R. DIETRICH) 13 June 1961 (1961-06-13)	
A	GB 830 283 A (GOODYEAR)	

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 December 1999	11/01/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Pemberton, P

1

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 950 104 A (P.C. BOWSER ET AL.) 23 August 1960 (1960-08-23) cited in the application	
A	US 5 201 500 A (BROWN MICHAEL M ET AL) 13 April 1993 (1993-04-13) cited in the application	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 99/10422

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 1540178 A		DE 1291566 B	
DE 29615901 U	24-10-1996	GB 2317213 A	18-03-1998
US 5535994 A	16-07-1996	CA 2117051 A	31-05-1995
US 2988353 A	13-06-1961	NONE	
GB 830283 A		BE 561179 A CH 362327 A DE 1107030 B NL 109093 C NL 220888 A US 3043582 A	10-07-1962
US 2950104 A	23-08-1960	DE 1048491 B FR 1200709 A GB 811546 A	23-12-1959
US 5201500 A	13-04-1993	AU 649292 B AU 8882291 A CA 2060644 A DE 69112603 D DE 69112603 T EP 0501043 A ES 2076456 T JP 4307134 A MX 9102793 A NZ 240968 A	19-05-1994 27-08-1992 27-08-1992 05-10-1995 15-02-1996 02-09-1992 01-11-1995 29-10-1992 01-08-1992 27-07-1993

M.H

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
DN1999111PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 99/ 10422	12/05/1999	
Applicant		
THE GOODYEAR TIRE & RUBBER COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

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[ ] contained in the international application in written form.

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[ ] furnished subsequently to this Authority in written form.

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[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

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[X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

[X] as suggested by the applicant.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

[ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/ 10422

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

Line 1: insert after "airspring" "(10)"
Line 1: insert after "airsleeve" "(14)"
Line 1: insert after "retainers" "(12,26)"
Line 2: insert after "retainer" "(26)"
Line 2: insert after "surface" "(52)"
Line 4: insert after "ribs" "(34,40,42,44,46)"

end of the sleeve being to one of the retainers, and the opposing end of the sleeve being secured to other retainer. One of the retainers has an integral bumper-contact surface which, when the airspring is assembled, extends into the sleeve for axial movement. The bumper-contact surface of the retainer also extends into the sleeve for making contact with the other retainer, and for absorbing and transmitting forces generated from such contact.

The disclosed retainer that has an integral bumper-contact surface is also comprised of support ribs. The support ribs may be a series of concentric ribs. The support ribs may also be radially extending ribs.

The disclosed retainer that has an integral bumper-contact surface may be defined by a first axially outer surface that extends into the airspring sleeve and a second axially outer surface that extends into the airspring sleeve. The axially outermost of the two surfaces is the bumper-contact surface and the axial difference between the two surfaces being greater than zero to separate the two surfaces by a dimension b.

The disclosed retainer that has an integral bumper-contact surface has an axial height H as measured from the axially outer most surface to the axially innermost surface. The surface-separation dimension b may be expressed as a ratio of the retainer height and may be from 20% to 80% of the retainer height H.

The airspring may further comprise a piston and the flexible sleeve may have a bead ring at one end. The bead ring may be secured between the retainer having an integral bumper-contact surface and the piston.

The retainer having an integral bumper-contact surface is formed from a thermoplastic material having a tensile strength in the range of 1965 to 3165 kg/cm^2 (28,000 to 45,000 psi), and a flex strength in the range of 2810 to 4220 kg/cm^2 (40,000 to 60,000 psi).

The retainer is preferably formed from a material selected from the following group: fiberglass reinforced nylon, long fiber reinforced thermoplastic, and short fiber reinforced thermoplastic.

Brief Description of Drawings

The invention will be described by way of example and with reference to the accompanying drawings in which:

FIG. 1 is a cross-sectional view of an airspring;

FIG. 2 is a cross-sectional view of the airspring piston and lower retainer;

FIG. 3 is a cross-sectional view of the retainer;

FIG. 4 is a view of the top surface of the retainer; and

FIGS. 5 and 6 are embodiments of the retainer.

by a series of radially extending ribs 48 (see Fig 4). The ribs 48 connecting the concentric outer 44 and intermediate 40 ribs may be termed as extensions of the ribs 42 connecting the central rib 34 and the intermediate rib 40. The ribs 48 continue to the outer surface 50 of the retainer 26, linking the bead retention flange 46 to the outer surface 50 of the retainer. The radially extending ribs 42, 48 provide structural support and strength to the retainer 26. The circular ribs 34,40,44 and the radially extending ribs 42,48 allow the forces absorbed by the retainer 26 to be transferred through the retainer 26 to the piston and the rest of the airspring as well as the structure upon which the airspring is mounted.

The retainer 26 has a surface 52 which extends into the chamber 20 created by the secured sleeve 14. The surface 52, also known as the bumper-contact surface, may be flush with the main surface 50 of the retainer 26, as illustrated in FIG. 5, or it may be separated from the surface 50 by a dimension equal to b, see FIGS. 3 and 6. The surface separation dimension b may also be defined as relative to the total axial height H of the retainer 26. The surface separation between the bumper contact surface 52 and the main retainer surface 50 may be considered to be an axial extension of the concentric rib 40. The radially extending ribs 42 will also extend the full depth of the retainer when the dimension b is greater than zero.

The retainer height H is measured from the axially outermost surface, which is the bumper-contact surface 52, to the axially innermost point of the retainer. All of the illustrated retainers are shown having an axially innermost point all corresponding to the same plane; however, if any of the concentric or radially extending ribs of the retainer extend beyond any of the other ribs, the height of the retainer is measured from that portion of the retainer which has the greatest axial length. The dimension b, when expressed relative to the retainer height H, may range from zero to approximately eighty percent (0-80%) of H. In FIG. 3, the surface separation distance b is approximately 25% of the retainer height H. In FIG. 6, the distance b is approximately one-half the retainer height H. For all of the illustrated embodiments of the retainer 26, the central portion 54 of the bumper-contact surface 52 is eliminated to reduce the weight of the retainer 26 and to maintain a uniform ring thickness to assist in molding the retainer 26.

The retainer 26 is formed of a high strength thermoplastic. The tensile strength of the material should be within the range of 1965 to 3165 kg/cm^2 (28,000 to 45,000 psi), have a flex strength in the range of 2810 to 4220 kg/cm^2 (40,000 to 60,000 psi), and notched izod strength of 0.117 – 0.703 N-m/mm (2.0 to 12.0 ft-lb/in). Materials that meet these required characteristics include, but are not limited to, fiberglass reinforced nylon, long fiber reinforced thermoplastic, commercially available as CELSTRAN, and short fiber

CLAIMS

What is claimed is:

1. An airspring (10) comprising a flexible cylindrical sleeve (14) secured at opposing ends, and first and second retainers (12, 26), the sleeve being secured at a first end to one of the retainers (12 or 26), and at the opposing end to the other retainer (26 or 12), the airspring (10) being characterized by:

one of the retainers (26) having an integrally formed bumper-contact surface (52) within the sleeve (14) for axial movement into the sleeve (14), for contact with the other retainer (12), and for absorbing and transmitting forces generated from such contact.

2. An airspring (10) in accordance with claim 1 wherein the retainer (26) having an integral bumper-contact surface (52) is comprised of support ribs (34, 40, 42, 44, 48).

3. An airspring (10) in accordance with claim 2 wherein the support ribs are substantially radially extending (42, 48).

4. An airspring (10) in accordance with claim 2 wherein the support ribs are a series of concentrically disposed ribs (34, 40, 44).

5. An airspring (10) in accordance with claim 1 wherein the retainer (26) having an integral bumper-contact surface (52) is defined by a first axially outer surface (52) which extends into the airspring sleeve (14) and a second axially outer surface (50) which extends into the airspring sleeve (14), the axially outermost of the two surfaces being the bumper-contact surface (52) and the axial difference between the two surfaces being greater than zero to separate the two surfaces by a dimension (b).

6. An airspring (10) in accordance with claim 5 wherein the retainer (26) having an integral bumper-contact surface (52) has an axial height (H) as measured from the axially outer most surface (52) to the axially innermost surface, and the surface-separation dimension (b) is 20 to 80% of the retainer height (H).

7. An airspring (10) in accordance with claim 1 wherein the airspring (10) further comprises a piston (28) and the flexible sleeve (14) is comprised of a bead ring (24) at one end, the bead ring

(24) being secured between the retainer (26) having an integral bumper-contact surface (52) and the piston (28).

8. An airspring (10) in accordance with claim 1 wherein the retainer (26) having an integral bumper-contact surface (52) is formed from a thermoplastic material having a tensile strength in the range of 1965 to 3165 kg/cm^2 (28,000 to 45,000 psi), and a flex strength in the range of 2810 to 4220 kg/cm^2 (40,000 to 60,000 psi).

9. An airspring (10) in accordance with claim 8 wherein the retainer (26) is formed from a material selected from the following group: fiberglass reinforced nylon, long fiber reinforced thermoplastic, and short fiber reinforced thermoplastic.

Add a9

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing: 23 November 2000 (23.11.00)	
International application No.: PCT/US99/10422	Applicant's or agent's file reference: DN1999111PCT
International filing date: 12 May 1999 (12.05.99)	Priority date:
Applicant: ARNOLD, John, Eric et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:
10 March 2000 (10.03.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra

Telephone No.: (41-22) 338.83.38